**Ch. 9 In class Review ANSWERS**

1. **We want to look at the percent of men who are colorblind. We take a random sample and find that there are 330 out of 1150 males are colorblind. The National Association of Medical Professionals claimed in a 2008 article that only 25% of all men are colorblind.**
   1. **Check the 3 conditions.**
      * 1. SRS 1) stated random sample
        2. Pop > 10n 2) There are more than 11,500 males in the US
        3. N > 30 or normal population 3) n = 1150 > 30
   2. **Is there evidence at the 0.05 level of significance to say that the % has changed (is not equal to 25%)?**

P = 0.25 α = 0.05

Ho: p = 0.25

Ha: p ≠ 0.25

2\*P(Z > 2.898) = 0.00376

We reject Ho b/c p-value < α = 0.05. We have sufficient evidence that the true % of men who are colorblind is not equal to 25% anymore.

* 1. **Create and interpret a 98% confidence interval for the true percent.**

We are 98% confident that the true % of colorblind men is between 25.6% and 31.8%.

1. **I perform a test of significance and I calculate a P-value of 0.06. Is this significant at the 1% level? How about the5% level? How about the 10% level?**

Significant = reject Ho

If the p-value is 0.06, it would not be significant at 0.01 or 0.05 (we would not reject). But it would be significant at 0.10 (we would reject at 0.10).

1. **I have a 92% confidence interval that is (0.22, 0.26). Which of the following could be the 94% confidence interval?**
   1. **(0.20, 0.24) b. (0.20, 0.28) c. (0.23, 0.25) d. (0.23, 0.27)**

ANSWER: B If we increase our confidence, our interval gets WIDER

1. **I have a 92% confidence interval that is (0.22, 0.26). Which of the following could be the 90% confidence interval?**
   1. **(0.20, 0.24) b. (0.20, 0.28) c. (0.23, 0.25) d. (0.23, 0.27)**

ANSWER: C If we decrease our confidence, our interval gets NARROWER

1. **I have an interval that is (0.30, 0.39)**
   1. **What is my sample proportion ()?**  = 0.345
   2. **What is my margin of error?** m = 0.045
2. **I want to sample HS seniors to see what percent of them plan to attend the senior prom. I want to have a 6% margin of error, and want to be 99% confident. What sample size should I take? Last year’s result was 86%.**



1. **Nationwide, it is estimated that 40% of gas stations have tanks that leak to some extent. A new program in California is designed to lessen the prevalence of these leaks. We want to assess the effectiveness of this program and take a random sample of 45 stations and find that 15 of them have leaks.** 
   1. **Check the 3 conditions.**
      * 1. SRS 1) stated random sample
        2. Pop > 10n 2) There are more than 450 gas stations in the US
        3. N > 30 or normal population 3) n = 45 > 30
   2. **Create a 94% confidence interval for the percent of stations that leak. Interpret your interval.**

n = 45 Confidence = 94%

1. 

We are 94% confident that the true % of gas stations with leaks is between 20.1% to 46.6%.

* 1. **Using this interval, do you think that the percent of stations with leaks has decreased? Why or why not?**

No, I do not think it has decreased from 40%. The reason for this is because 40% is in the interval created above. Therefore it is a possible value for the true percent.

* 1. **Explain what 94% confidence means in this context.**

In repeated samples of size 45, 94% of the confidence intervals created will catch the true % of gas stations that leak

* 1. **If I decrease my confidence to 90%, what will happen to:** 
     1. **the critical value** decrease
     2. **the margin of error** decrease
     3. **the confidence interval?** narrower
  2. **If I decrease my sample size to 30, what will happen to:** 
     1. **the critical value** increase
     2. **the margin of error** increase
     3. **the confidence interval?** wider

1. **I want to create a 96% confidence interval with a 2.5% margin of error. What sample size should I take? (we do not know the )**

n = 1688

1. **Many doctors believe that teenagers do not get enough Vitamin C. Previous studies have indicated that up to 42% of teenagers are Vitamin C deficient. PA decides to implement a program to educate students about getting Vitamin C, in hopes of decreasing the % of teenagers who are deficient. After a year, researchers take a random sample of 200 total HS students. They find that only 76 of them are Vitamin C deficient.** 
   1. **Check the 3 conditions.**
      * 1. SRS 1) stated random sample
        2. Pop > 10n 2) There are more than 2000 high school students
        3. N > 30 or normal population 3) n = 200 > 30
   2. **Is there sufficient evidence at the 5% significance level that the campaign worked (and the % decreased)? Perform a full test of significance.**

p = 0.42 n = 200 α = 0.05

H0: *p* = 0.42

HA: *p* < 0.42



P(Z < -1.146 ) = 0.126

We fail to reject the Ho b/c the P-Value of 0.126 is greater than alpha = 0.05. We ***DO NOT*** have sufficient evidence that the true % of students with a vitamin deficiency is less than 42%.

1. **What are the 4 steps you need to do when completing a confidence interval?**
   * + - 1. Conditions
         2. Formula
         3. Interval (a, b)
         4. Sentence
2. **What are the 5 steps you need to do when completing a test of significance?**
   * + - 1. Conditions
         2. Hypotheses
         3. Test statistic (Z score formula)
         4. P-Value
         5. Conclusion (2 sentences)
3. **What is inference?**

Making conclusions about a population from a sample

1. **What is inference based on?**

Sampling distributions

**BONUS:**

1. **What is the Z\* for a 91% confidence interval? Show work!**

z\* = 1.695

1. **I have an interval that is (0.40, 0.48)**
   1. **What is my sample proportion ()? What is my margin of error?**

m = 0.04

* 1. **If my sample size is 200, what is my level of confidence? (show work!)**

Z\* = \_\_\_\_\_\_\_\_\_

Confidence = 74.45% confidence